

Indiana - July 2008 (ver. 1.0)

Indiana GUIDE SHEET

Catastrophic rain fall and flooding can leave many fields in a state of ruin that few have ever encountered. Not only may the current year's crops and nutrients be lost, but fields may have widespread damage and/or may have lost soil chemical and biological function that may take time and significant changes in management to regain productivity. The following are suggested steps to reclaim fields to a farmable state and rebuild the soil health, function and productivity.

In most cases, cover crops and/or perennial cover will offer the soil the quickest and best opportunity to regain its biological properties. A growing cover through as much of the year as possible, will re-establish the mycorrhizae and enhance the other biological properties of the soil, add organic material and nutrients back to the soil, as well as provide protection against erosion.



What to do first!

- 1. Assess, inventory and map (preferably with GPS) the damage types and locations.**
 - a. Damages to identify include: Debris, deep sand deposits (greater than 6"), silt and clay deposits, scour erosion (loss of topsoil), deep scour erosion (>1'), standing water, gully erosion, broken levees, plugged surface inlets, damaged practices, and unstable dams or levees.
 - b. By mapping the areas, better decisions can be made, repairs will be far more efficient, and priority decisions more clear.
- 2. Prioritize Repairs**
 - a. Address safety concerns first.
 - b. Pick the "low hanging fruit". The overall damage may be overwhelming. Making the quick and easy repairs which allow large blocks of land back into production and will facilitate better, less emotional decisions to address the more severe damage.
 - c. Repairs to isolated areas (i.e. – smaller sand deposits) surrounded by larger areas with minimal damages (i.e. – areas needing only a tillage pass or replant) can gain the largest return for the effort.
 - d. Repairs to areas that are likely to have recurring damage may be in vain until more permanent repairs to levees or drainage systems can be made.
- 3. Identify a cover crop seed source**
 - a. Since cover crops will be essential in most cases toward restoring the lost soil functions, obtaining seed as early as possible will maximize the choices available and ensure that the soil re-building process can start as soon as possible.

Flood plains with damage from head water:

Short Term - spring through summer

- 1. Debris removal.**
 - a. Where possible remove debris from the flood plain.
 - b. Anchoring or burning may be an option.
- 2. Inspect drainage systems.**
 - a. Check for plugged risers and breathers.
 - b. Check outlets for obstructions or damage.
 - c. Check for holes.
 - d. Make sure scour erosion hasn't exposed or reduced cover over tile.

3. **Evaluate the crop stand** in those areas where crops were flooded, but field damage was minimal to see if replanting is immediately necessary or possible.
 - a. If replanting is not possible, establish a **summer annual cover crop** such as Sorghum-Sudangrass, Millet, or Buckwheat as soon as possible.
 - b. Water will likely be the most limiting factor for late planting. Use a no-till system to preserve remaining moisture.
 - c. Saturation sufficient to kill a crop will also kill soil organisms and microbes. Soybeans and other legumes should be inoculated.
4. **Spread or haul sand.** Some areas may have suffered broad loss of top soil. Assess the condition of the remaining soil for compaction and sealing. This may require an operation with a chisel plow or a rotary harrow prior to sand spreading.
 - a. Thick sand deposits will need to be hauled (with a pan or trucked) and spread in scour areas or off site.
 - b. Remaining sand should be spread to less than 6" depths to make incorporation more feasible.
5. **Incorporate sand with underlying soil.** If sand can be spread to a layer of less than 3", incorporation may not be needed.
 - a. An offset disc or disc plow with large diameter (>24" discs) may be the preferred tool for incorporating sand with existing soil.
 - b. A chisel plow with twisted shanks, run as deep as possible, should be adequate for shallow incorporation.
6. **Level and prepare seedbed**
 - a. In most cases a field cultivator or multi-purpose finishing tool will adequately level the field
7. **Replant if possible**
 - a. See #3 a-c above
8. **Fill and/or seed scoured areas with a temporary cover.**
 - a. Sand should be stockpiled if these areas still hold water or are too wet.
 - b. A permanent sod cover should be seeded (after August 1) to areas which will have reoccurring flow.
9. **Drowned out permanent vegetation.**
 - a. Remove excess sediment from permanent vegetation areas (levee toes, buffers, etc.) and re-establish during the next acceptable planting dates.
10. **Scout the crop and field regularly**
 - a. Mark trouble spots with GPS for fall inspection and treatment.

Fall and post harvest:

1. **Conduct a fall soil test and evaluate yield maps.**
 - a. Apply nutrients (**P & K only**, **Nitrogen applications in the fall/winter are not recommended due to potential losses**)
 - b. Deep banding or incorporating is preferable to avoid nutrient losses and placement below the poorly structured surface.
2. **Address additional identified soil quality problems** such as sand deposition, compaction, loss of organic matter, and/or loss of biological organisms.
 - a. A subsoiler or large offset disc plow may be needed break hard pans and further incorporate deposits.
 - b. Adding 1-2 tons (3000-5000gal.) manure or compost may help build organic matter, nutrients, and feed biological growth.
3. **A final leveling** with a land leveler or finishing tool may be needed.
4. **Seed a winter cover crop** to further address compaction, rebuild soil structure, enhance the repopulation of beneficial organisms (i.e. mycorrhizae, earthworms etc.) and provide protection for the loosened soil condition. Inoculate legumes.

Following season(s):

1. **Use a No-Till or Mulch-Till cropping system** to offer continued soil protection and structure building.
2. **Starter fertilizer** containing phosphorus may be more advantageous than normal to help offset mycorrhizal loss - particularly in long duration saturated and flooded soils.
3. **Inoculate soybeans and legumes.**
4. **Scout for pests.** Catastrophic flooding and erosion can introduce new threats and/or remove natural defense organisms. (i.e. Soybean may be more subject to Sudden Death Syndrome)
5. **Continue a close monitoring of nutrient needs and placement.**
 - a. Banding below the sandy surface will increase season long availability.

6. **Continue monitoring and inspecting the drainage systems.**
7. **An additional year(s) of cover crops** will be very beneficial to restoring the soil's function and productivity along with trapping crop residues and protecting the soil from erosion.

Flood plains damaged from back water:

Follow many of the steps from above in addition to:

1. **Silt and clay deposits** may need to have an aeration tool or a rotary harrow ran to break and incorporate the surface crust.
2. **Drifted crop residues** may need to be removed from culvert risers or field edges and burned or spread.

Upland fields with damage from excessive runoff:

Short Term - now through summer:

Follow many of the steps from above in addition to:

1. **Inspect Conservation Practices.** Some of the most common occurrences are:
 - a. WASCOBS, Terraces, Ponds, Dams, and Diversions may have over topped or undermined.
 - b. Grassed Waterways and other concentrated flow areas may need to be re-graded and seeded.
 - c. Grade Stabilization Structures need to have wing walls and weirs checked for scouring.
 - d. Pipe structures should be cleared of drift and debris.
 - e. Rock chutes may need to be re-graded or shaped.
 - f. Remove sediment from permanently-vegetated areas and replant if needed.
 - g. Check pond and dam spillways for debris and vegetation for scour.
2. **Extensive rills and ephemeral gullies** may have occurred following planting tracks, planter markers, nitrogen knives or other tillage operations.
 - a. If rills/gullies are so severe and widely present, the entire field will need to be treated by grading and leveling with a field cultivator or finishing tool.
 - i. If these are HEL check with the local NRCS office to see if they may fall under a state or area wide variance.
 - b. Some gullied areas may require a **permanent erosion control practice**.
 - i. Grade so they can be crossed for harvesting.
 - ii. Seed to a temporary cover crop or double seed it with the replant operation.
 - c. Some areas may experience erosion in need of **temporary repair** for replanting or so fields can be harvested.
 - i. Grade to a flat bottom to spread future runoff and reduce velocity.
 - ii. Seed to a temporary cover crop or double seed it with the replant operation.
3. **Cover Crops** will be essential for any areas that cannot be replanted due to damages or time of year.

Fall and post harvest:

Follow many of the steps from above in addition to:

1. **Seed a winter cover crop** to further address compaction, rebuild soil structure, enhance the repopulation of beneficial organisms (i.e. mycorrhizea, earthworms etc.) and provide protection for the loosened soil condition. Inoculate legumes.
2. **Make final repairs to conservation practices.**

Following season(s):

Follow many of the steps from above in addition to:

1. **Additional years of cover crops integrated with a no-till cropping system** will be very beneficial to restoring the soils function and productivity along with trapping crop residues and protecting the soil from erosion.
2. **Continue to monitor and maintain conservation practices.**

Severely Damaged Areas or Areas with Frequent Damage:

1. **Identify those parts of the field that have been damaged beyond affordable repair and/or that have had recurrent damages from past flood events.**
 - a. Consider permanently retiring these parts of fields by establishing to permanent vegetation.
 - b. **Focus the money and time that would have been spent to improve other, more-productive lands on the farm.**

Through each step, follow a defined path to improving the soil quality and function. As with most important decisions, following a basic planning process will serve you well!

Additional References:

Indiana NRCS Agronomy page:

<http://www.in.nrcs.usda.gov/technical/agronomy/Indiana%20Agronomy%20Resources/Agronomy%20Resources.html>

Purdue University Cooperative Extension Service References:

Considerations for Replanting Soybean in Drowned out Corn Fields

[Johnson & Nice, 2008](#);

Effects of Flooding or Ponding on Young Corn [Nielsen, 2008a](#);

Recent Weather May Promote Unusual Disease Problems in Corn [Shaner, 2008](#);

Tillage System Choices for June Planting or Replanting after Flooding [Vyn, 2008](#).

Sustainable Agriculture Research and Education (SARE): <http://www.sare.org/publications/>

Natural Resources Conservation Service - Field Office Technical Guide (eFOTG):

<http://efotg.nrcs.usda.gov/treemenuFS.aspx>

Post Flood and Fallow Syndrome Examined, Paul Carter, Pioneer Hi-Bred International, Inc., and Dan Wiersma, University of Wisconsin.